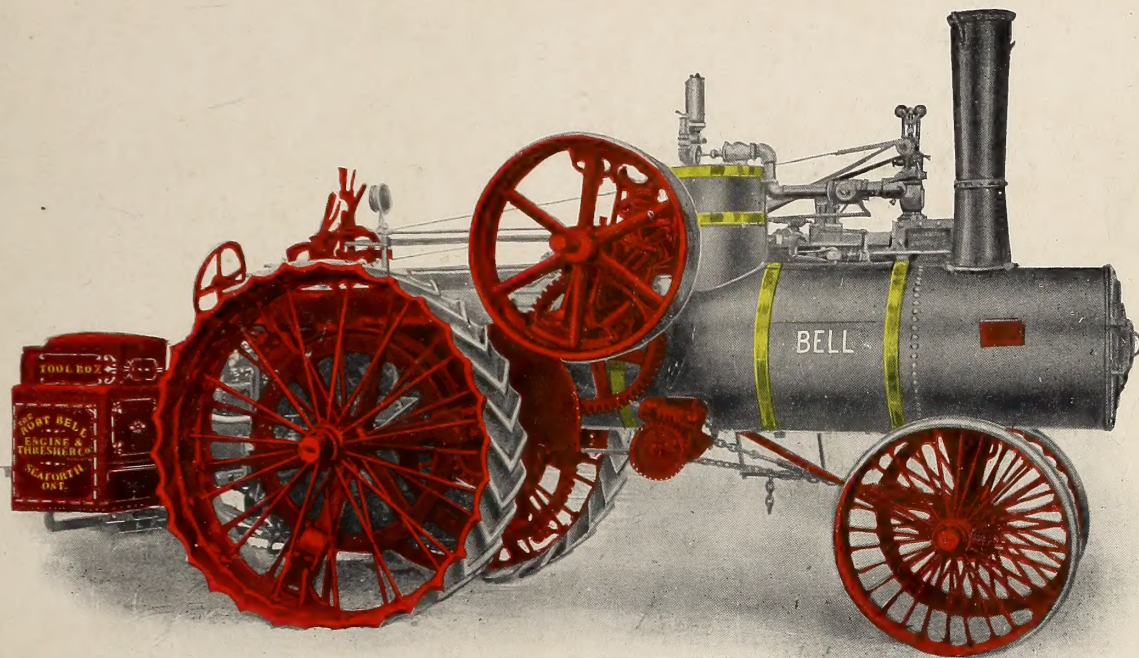
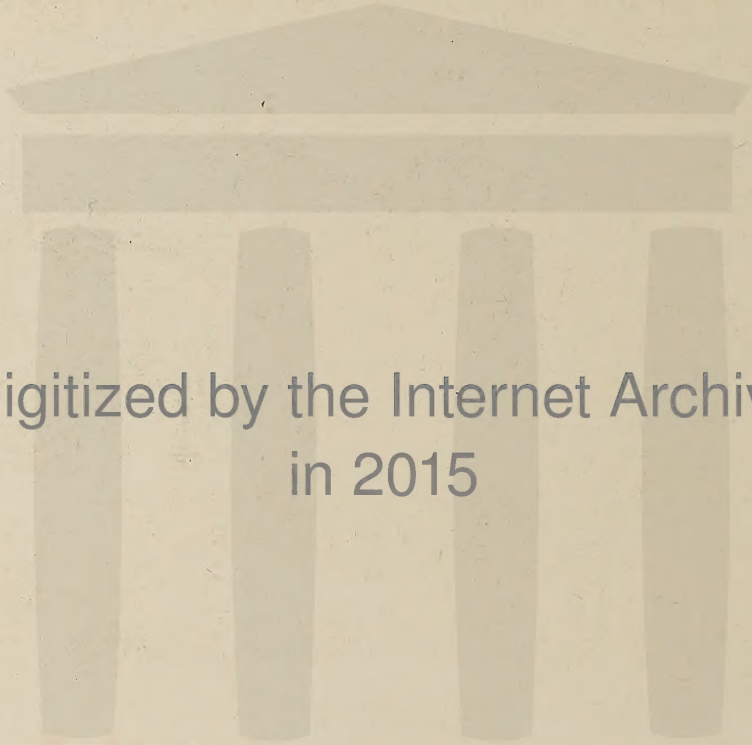


IMPERIAL MACHINERY



The Robert Bell Engine and Thresher Co., Limited
SEAFORTH, ONTARIO, CANADA



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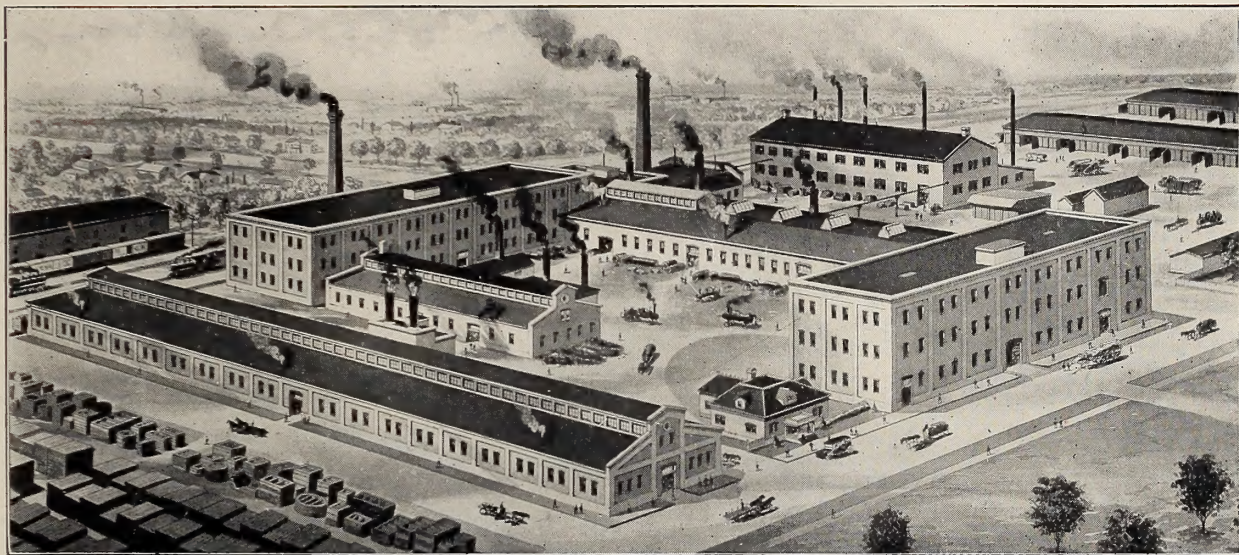
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The Robert Bell Engine and Thresher Company

LIMITED

SEAFORTH • ONTARIO • CANADA

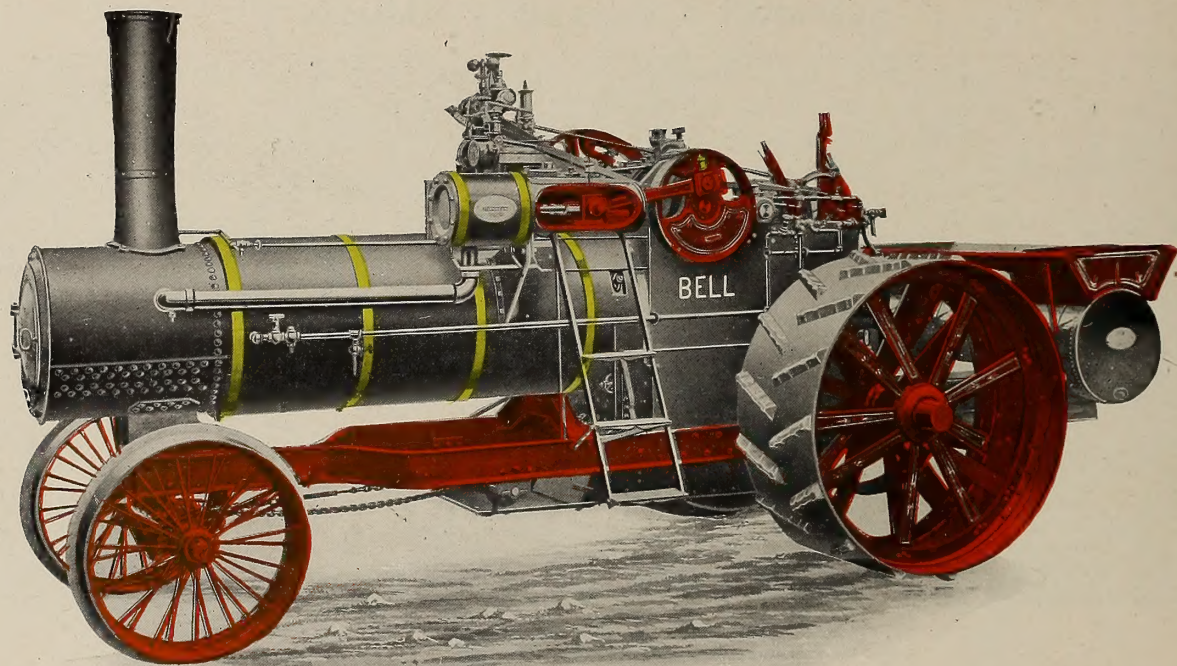


Manufacturers of

**Plowing Engines • Traction Engines • Portable Engines • Boilers
Stationary Engines • Threshing Machinery • Sawmill Machinery**

Branch Offices and Warerooms at: WINNIPEG, MAN., and REGINA, SASK.

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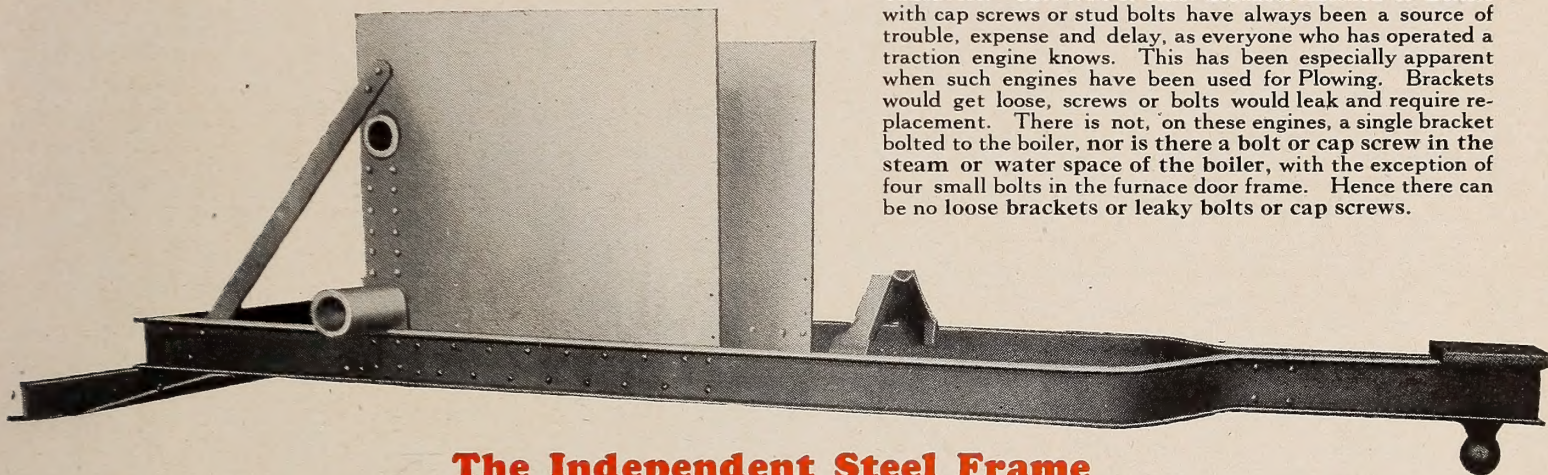


30 H. P. Rear Mount Traction Engine

24 H. P. & 30 H. P. Rear Mount Heavy Duty Traction Engines

These Engines are without doubt many years in advance of any other Traction Engines on the market to-day. Their advantages are so plain that the new principles involved will be found generally adopted within a very few years on all traction engines. They are built entirely on new lines, following closely the design of a railway locomotive, in so far as the different line of work each has to perform will permit.

In these Engines we have striven to eradicate the deficiencies of the usual type of traction engine, and have more than succeeded in our endeavors. Cast Iron or other Brackets fastened to Boilers with cap screws or stud bolts have always been a source of trouble, expense and delay, as everyone who has operated a traction engine knows. This has been especially apparent when such engines have been used for Plowing. Brackets would get loose, screws or bolts would leak and require replacement. There is not, on these engines, a single bracket bolted to the boiler, nor is there a bolt or cap screw in the steam or water space of the boiler, with the exception of four small bolts in the furnace door frame. Hence there can be no loose brackets or leaky bolts or cap screws.



The Independent Steel Frame

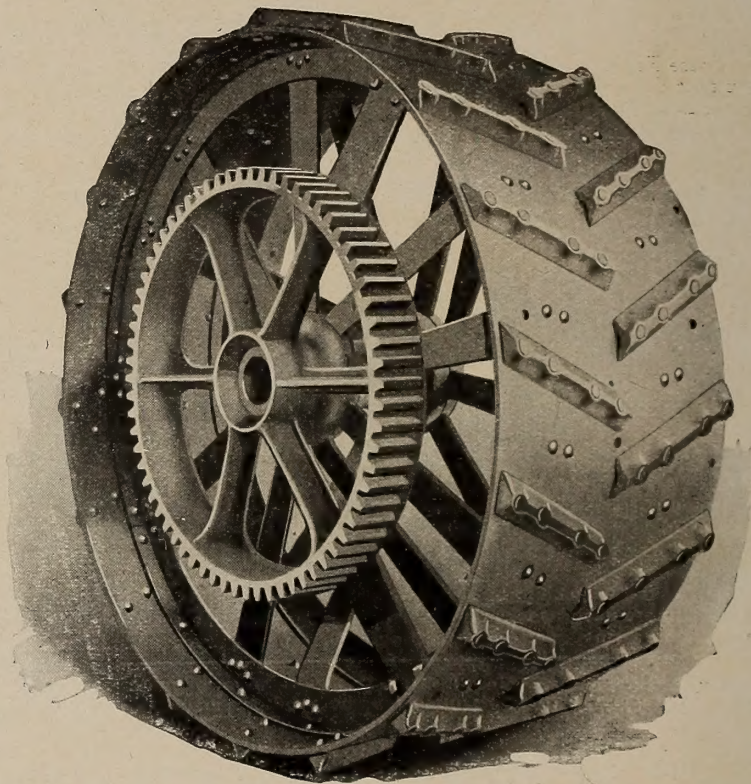
In the usual type, with brackets bolted to the boiler, all the power of the engine is transmitted to the driving-wheels through gears, shafts and brackets attached to the plates of the boiler. The strains and twists from this cause are very great resulting in leaky seams, stay bolts and tubes. In our new design we have removed all this strain from the boiler. To accomplish this result we use a separate or independent steel frame on which the Crank Shaft, Intermediate Gear Shaft, Counter Shaft and Axle is mounted. The strain is transmitted through this independent steel frame to the drivers, not through the plates of the boiler.

The Boiler receives no other strain than to carry its own weight. It is a steam boiler, nothing more, and not a carry-all for the engine and gearing. Indeed, by the removal of a few bolts and accessories, the boiler can be removed from the engine frame in which it rests, under steam pressure if desired. The elimination of stud bolts and cap screws and all traction strain will more than double the life of the boiler, and if kept clean, will last for years with practically no expense for repairs.

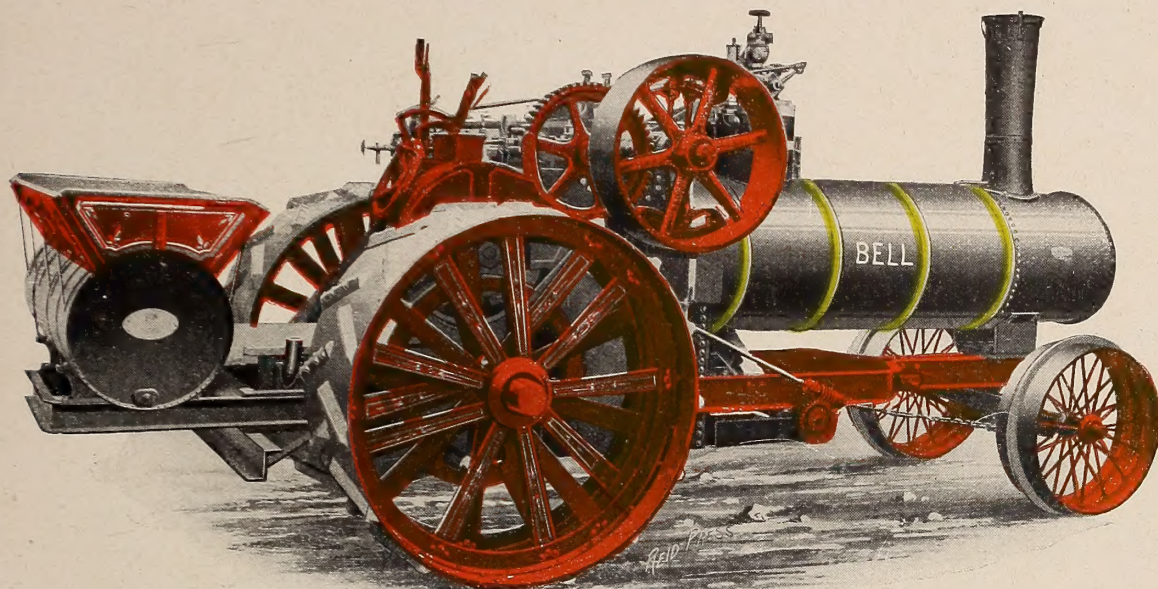
Cylinder of 30 H. P. is 11-inch diameter, 11 inch stroke. Boiler is of the very best material, and highest grade of workmanship. Longitudinal seams are double butt strapped with six rows of rivets, and under Interprovincial Ontario, Alberta and Saskatchewan specifications is allowed a working pressure of 175 pounds to the square inch.

Driving Wheels on the 30 H.P. size are patterned after the good old English type, with heavy steel rims, 30-inch face, reinforced inside with two heavy steel T rings, to which the outer ends of the large, flat spokes are rivetted, the other end being cast solidly into the hub, making practically a single piece of hub and spokes.

The 24 H.P. size is equipped with our regular heavy self cleaning type of wheels, with cast rim, which we have used for so many years with excellent results. We have been building these wheels for 25 years, and we have made very few replacements.



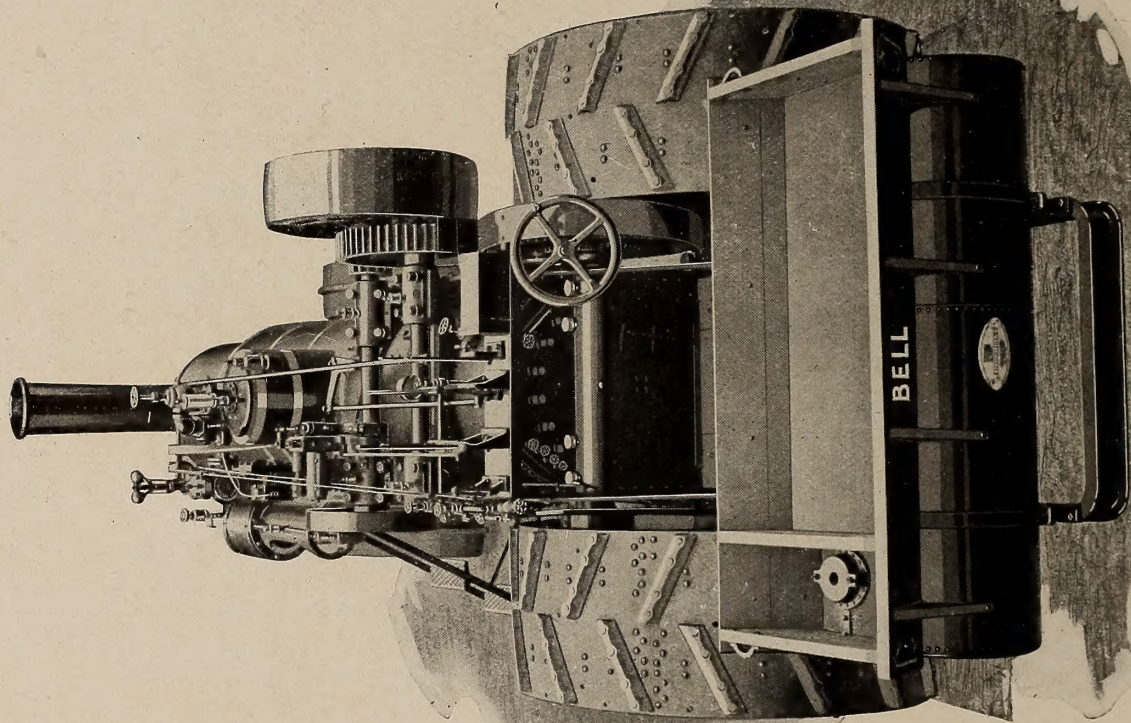
Special Steel Wheels for 30 H.P. Rear Mounted Engine



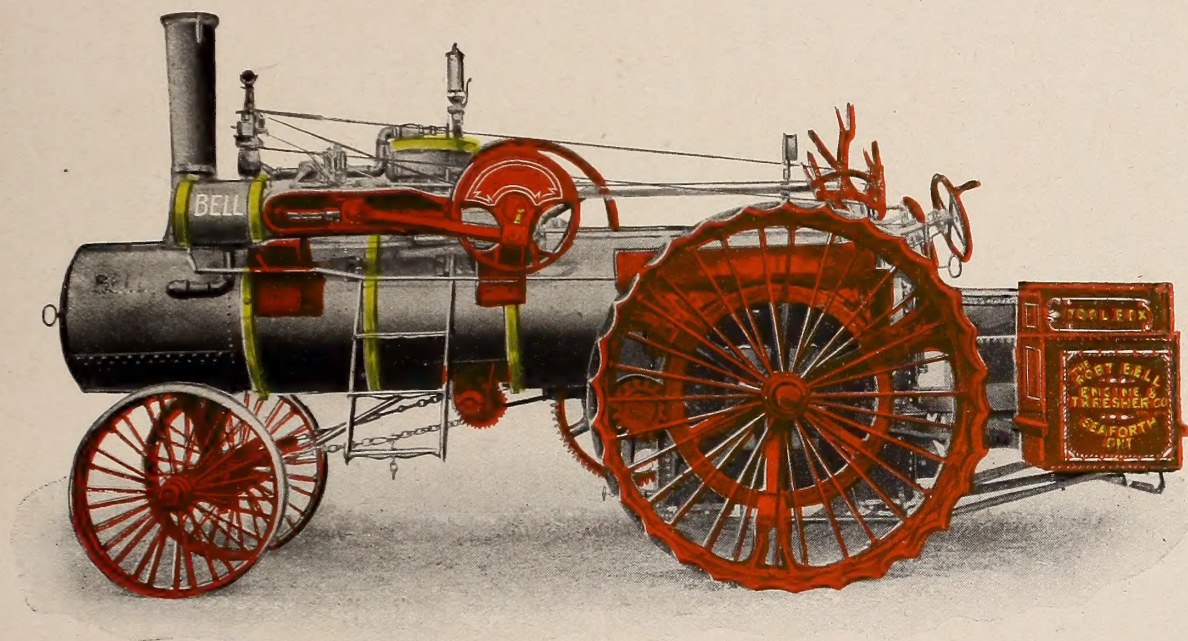
24 H. P. & 30 H. P. Rear Mount Heavy Duty Traction Engines

Gearing on the 30 H.P. size is all open hearth, heavy cast steel bushed with phosphor bronze where necessary. These gears may wear out but it is absolutely impossible to break them.

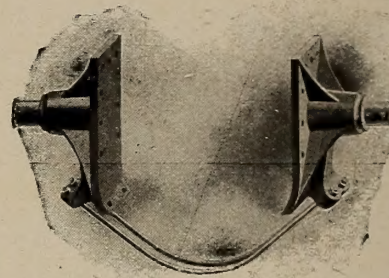
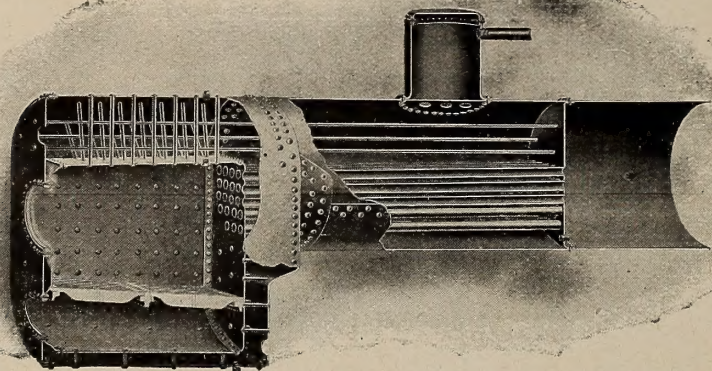
The 24 H.P. size is furnished with semi steel gears, extra heavy, reinforced with double flanges.



Top View of 30 H. P. Rear Mounted Engine



21 and 24 H. P. Simple Side Mount General Purpose Engine



Boilers for Side Mounted Engines

All our Traction Boilers are of the high pressure type, built for a working pressure of 175 pounds to the square inch.

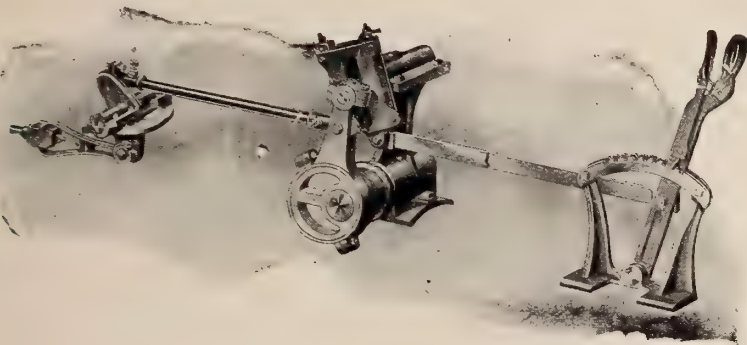
Notice, per the accompanying cut, the great strength of the waist seams of our boiler—the “backbone” of any boiler. Double rivetted throughout, as compared with single rivetted waists of other makes, which construction is apt to leak at the first heavy strain imposed in the working of the engine.

Extra thickness of plate, all flue sheets in all sizes are $\frac{1}{2}$ -inch thick in fire-box end. Outside shell plates are $\frac{3}{8}$ -inch thick. All flat surfaces thoroughly stayed and braced with rods running full length of the boiler from head to head. Safer at 175 pounds pressure than many boilers at 100 pounds, or even less. See page 36 for Specifications and Dimensions of all sizes.

Plenty of hand holes are provided for cleaning purposes, and the water bottom provides a reservoir away from the heat for deposits of impurities, from whence they can be easily removed before they are baked hard. Open bottom boilers can be furnished made to order when desired. Heavy wrought iron rings around fire doors.

Ample capacity is provided in the boiler for engine designed to go on it.

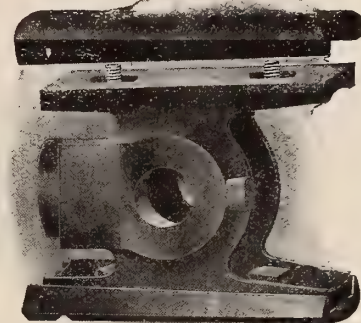
We submit herewith an illustration of our rear axle brackets. Note that the main weight of the boiler is carried in the two heavy truss rods passing around the bottom of boiler. Brackets have large bearing surface on the boiler, and attached with an unusual number of stud bolts. Drivers, with this construction, will NEVER tip in at the top. Axle stubs removable and reversible.

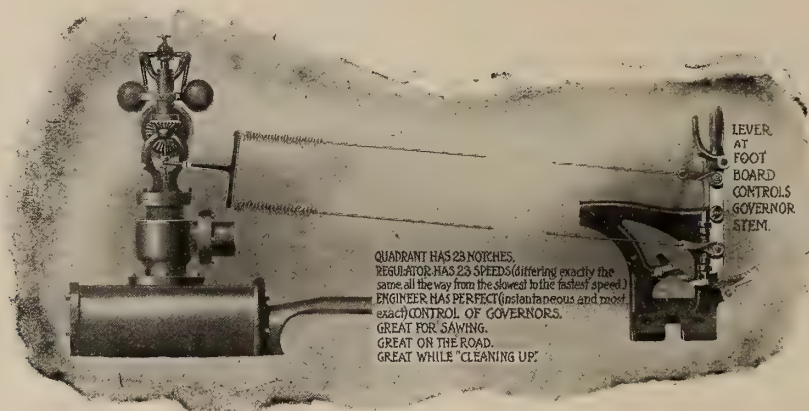


The Valve Gear is the most important part of the Engine proper. Illustrated herewith is our Valve Gear, which is easily understood. There is not a single point of wear but has provision made for taking it up, so that a noisy clattering valve gear in a Bell Engine is unknown. Most of the adjustments are made on the wedge principle space, same as is used in our connecting rod brasses, cross-head shoes and other places. It contains the desirable features of all other good valve gears with none of their deficiencies.

The cut of Crosshead, as used in Bell Engines, shown herewith, explains the very simple manner in which any wear in this part is taken up, without the use of packing, liners or babbitt metal. Simply the loosening of set screws and sliding the shoes up the incline takes up all wear.

A counterbalanced disc of large diameter allows our Engines to run at fastest speed without the slightest vibration. We brought out this very desirable feature years ago, and it has since been widely imitated. But we have yet to find an engine as thoroughly counterbalanced as our own.





Speed Changer

With this device the machinery can be speeded much more satisfactorily and easily than by turning the hand screw on governor. Changes in speed can be made quickly and accurately, as each notch in the quadrant represents an exact speed, which is much more satisfactory than guessing at the number of turns of the governor screw in the old way.

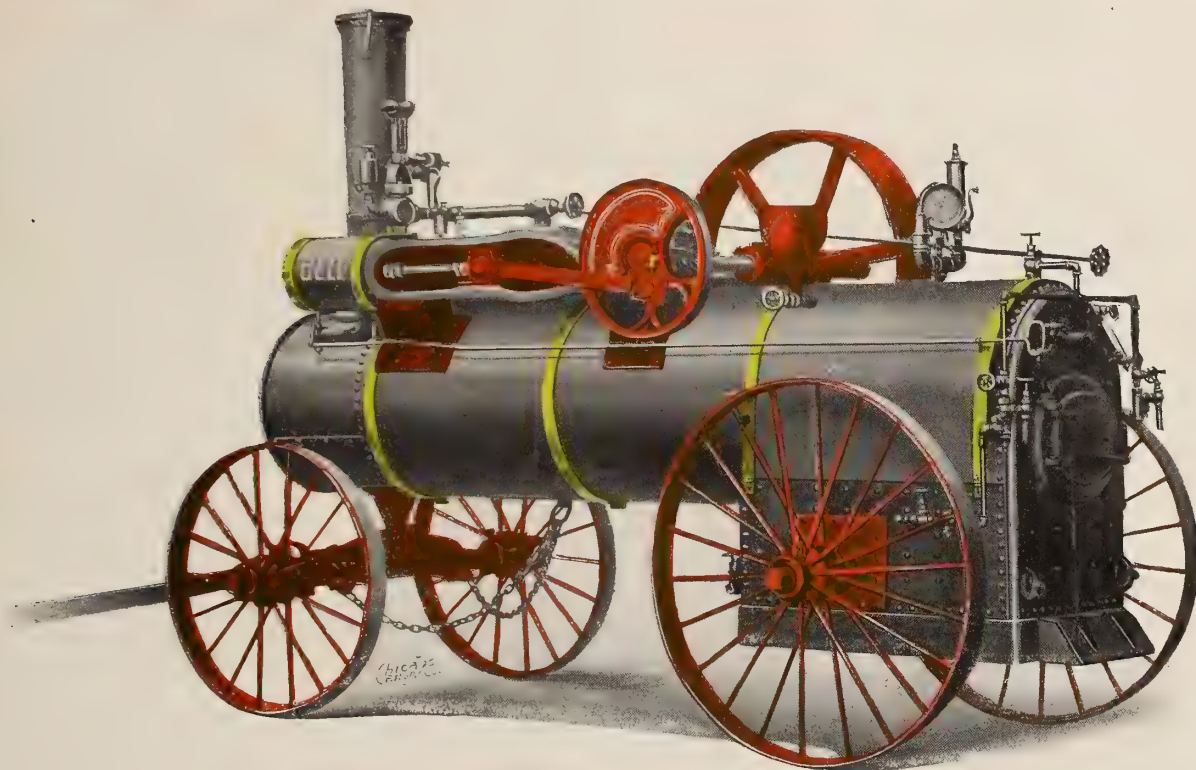
Twenty-three exactly different speeds, between about 100 and 300 revolutions can be had instantly by movement of lever within reach of engineer's platform. Splendid device for crossing rough or dangerous places, such as railway crossings, bridges, etc., as the engine is under complete control of the engineer, with the lever the engineer can move the engine as slowly and steadily as desired. No traction engine is complete without this patent Speed Changer.

Gear Lock Used on Side Mounted Engines

No blocking is needed with our engines. This Gear Lock is better than blocking in holding the engine against the main belt; also better in saving time and bother to the engineer.

It is composed of a short lever carrying two short pawls or ratchet dogs, which engage the cogs of the intermediate gear. When the gear lock lever is thrown ahead, the dogs automatically drop into the gear and lock the engine rigidly against the belt or forward pull. A backward movement of the lever lifts the dogs from the gear and permits the engine to travel ahead.

If the belt becomes slack while threshing the engine may be moved back by means of the friction clutch an inch or two at a time, to keep the belt in proper tension. Same cannot be easily done with a block, but, with this gear lock, the belt can always be kept at proper tension by the engineer alone without an assistant to handle the block.

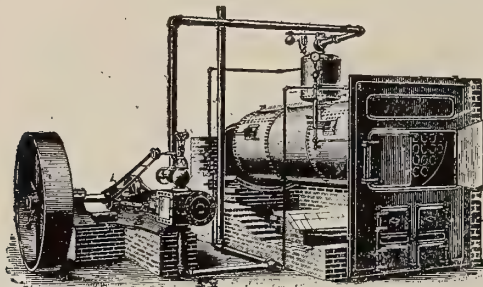


Portable Engine on Wheels—10 to 100 H.P.

Boilers Built to carry 175 lbs working pressure.

Plain Self-Contained Throttling Engine

WITH STANDARD STATIONARY TUBULAR BOILER.



bearing bar, arch castings, rear door, safety valve, steam gauge, water column and pipe connections, glass water gauge, gauge cocks, whistle, blow-off cock, check valve, stop valve and stack, with guys.

Each outfit contains our new pattern, plain, Self-Contained Throttling Engine, with Gardner Governor, as shown in cut, with band wheel, throttle valve, sight-feed cylinder lubricator and connections, oil cups, cylinder cocks, gland wrenches and governor belt.

Stationary Tubular Boiler, with full front, grates, grate-

Portable Boilers on Wheels or Skids

The demand for Portable Boilers with large steaming capacity, where fuel of a light bulky nature, such as the refuse of Sawmills and Planing Mills has lead to the adoption of this type for such service. The fire-box has been made in all sizes, long and deep, much longer and deeper than the ordinary locomotive Boiler. Recent experiments, conducted by skilled Engineers show that the Boiler with the large deep fire-box gives greatly increased efficiency over the ordinary shallow type fire box, and with the large grate surface, giving large capacity for light rough fuel. The 2 inch Tubes of the proper length insures great economy with forced draft, such as is used with portable sawmills, and many other similar lines of work the capacity of this Boiler will increase from 25% to 50%.

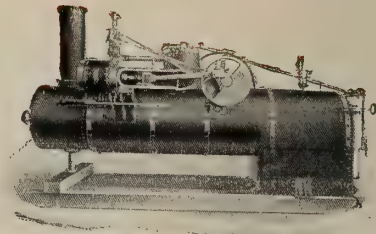
They can be set either on wheels or skids, in any size from 10 to 100 H.P. The Fixtures comprise Grates, Stack and Guys.

The Fittings are Safety Valve, Steam Gauge, Water Cock, Gauge Cocks Blow off, Feed and Check Valves, Whistle and Pipe for same. Injector and Pipes are extras.

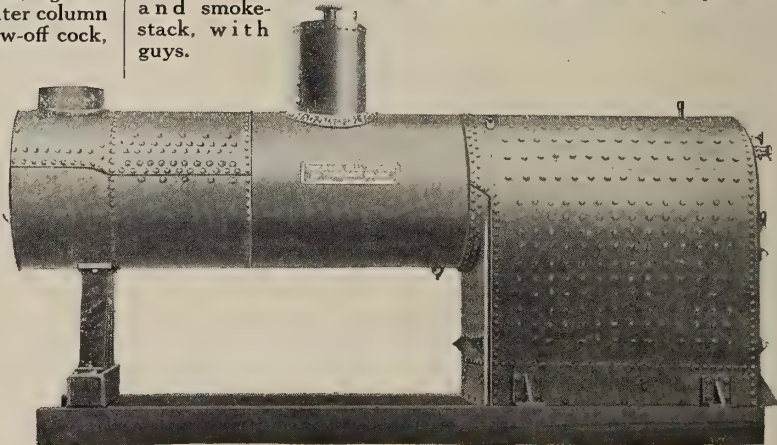
Portable Engines on Skids

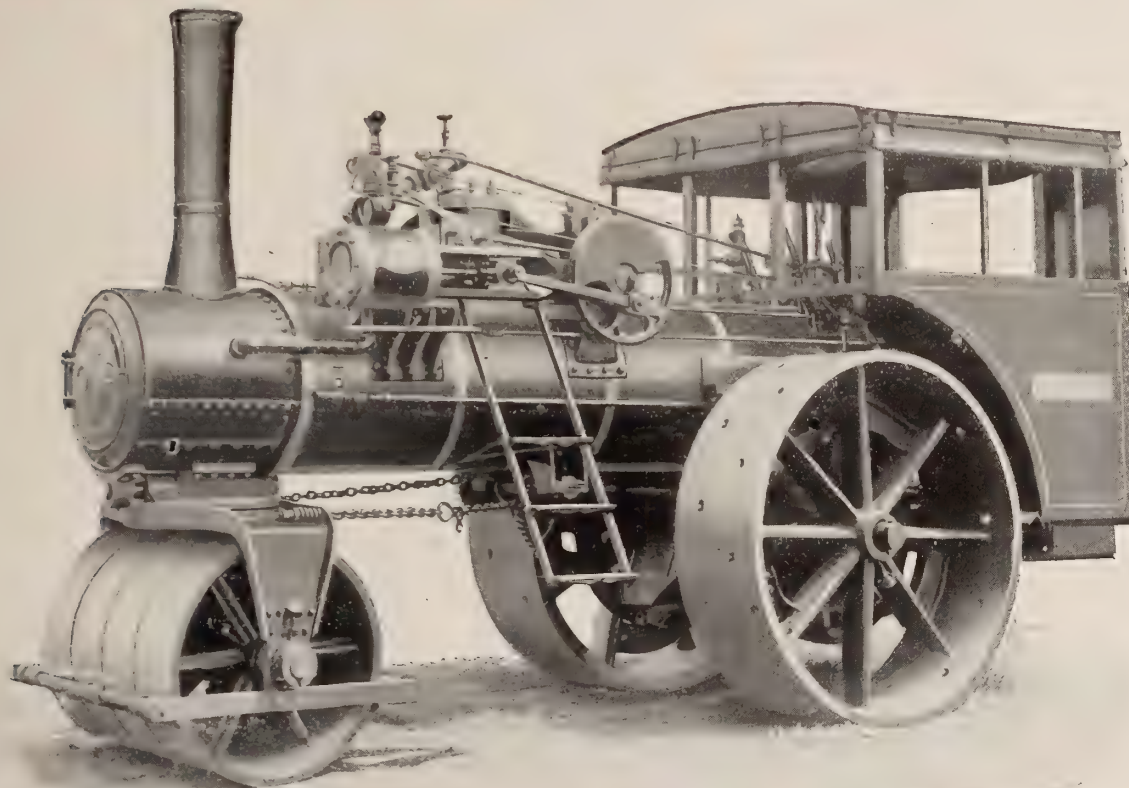
Each outfit includes our new pattern, plain, Self-Contained, Throttling Engine, with Gardner Governor, as shown in cut, band wheel, throttle valve, sight-feed cylinder lubricator and connections, oil cups, cylinder cocks, gland wrenches and governor belt.

Safety valve, steam gauge and syphon, glass water gauge, gauge cocks, whistle, blow-off cock, check valve, stop valve and smoke-stack, with guys.



10 to 100 H.P.





**10, 12 and
15 Ton
Road
Roller**

Special descriptive
Circular will be sent
on application.

Bell Road Rollers

10, 12 and 15 Ton

Boilers

These Road Rollers are built with large Boilers, which are constructed under the Ontario Government specifications and regulations. They are inspected three times while under construction, and are extremely strong, well made, and easily steamed. The fire boxes are large with ample water space all round. Most of the Road Rollers on the market to-day have small Boilers, and are very hard to steam. It is important a Boiler of this kind will burn any kind of fuel, that can be had, and steam easily. On the 12- and 15-ton sizes the plate is $\frac{3}{8}$ inch thick. The barrel is Triple rivetted on the longitudinal seam, and also double rivetted around the waist seam. All pipe openings of 1 inch and over in the boiler shell are re-inforced by adding an extra thickness of plate, which is rivetted to the shell, making a very strong joint, and preventing possibility of leaks. The Boiler is also re-inforced by an extra thickness of plate under all brackets, giving double thickness for threads on all studs. These Boilers are built to carry steam pressure of 175 lbs. per square inch and are tested at 265 lbs. C.W.P.

Rolls

The Rolls are made of semi-steel, with extra heavy rims, and extra heavy spokes, so strong that replacements are never required. Not a single Roll has ever been replaced since we commenced building these Rollers.

Gears

The Driving Gears are separate, and attached to the Rolls by bolts. These are easily replaced in case of damage.

Engines

The Engines are of the simple cylinder type. The valve is the ordinary slide valve of the locomotive type. Both the Valve and the

Seat are machined very carefully and scraped by hand to a perfect surface. We use the celebrated Patented Grimes Reverse on the engine of these rollers; with it only one eccentric is required. It is the same as we have used on our regular Road Engines for over fifteen years.

The Clutch

The Friction Clutch is an extremely simple device, and one that we have built for many years, and it has given universal satisfaction.

The Front Rolls roll the entire space between the two rear rolls and overlap about two inches on each side.

Very few municipalities have sufficient work to keep a Road Roller in use continually. This Roller of ours is equally useful for hauling heavy crushers, or any other heavy hauling, and it is equipped to do all kinds of belt work, so that the machine can be kept in use the entire season.

Heavy Duty Road Engines

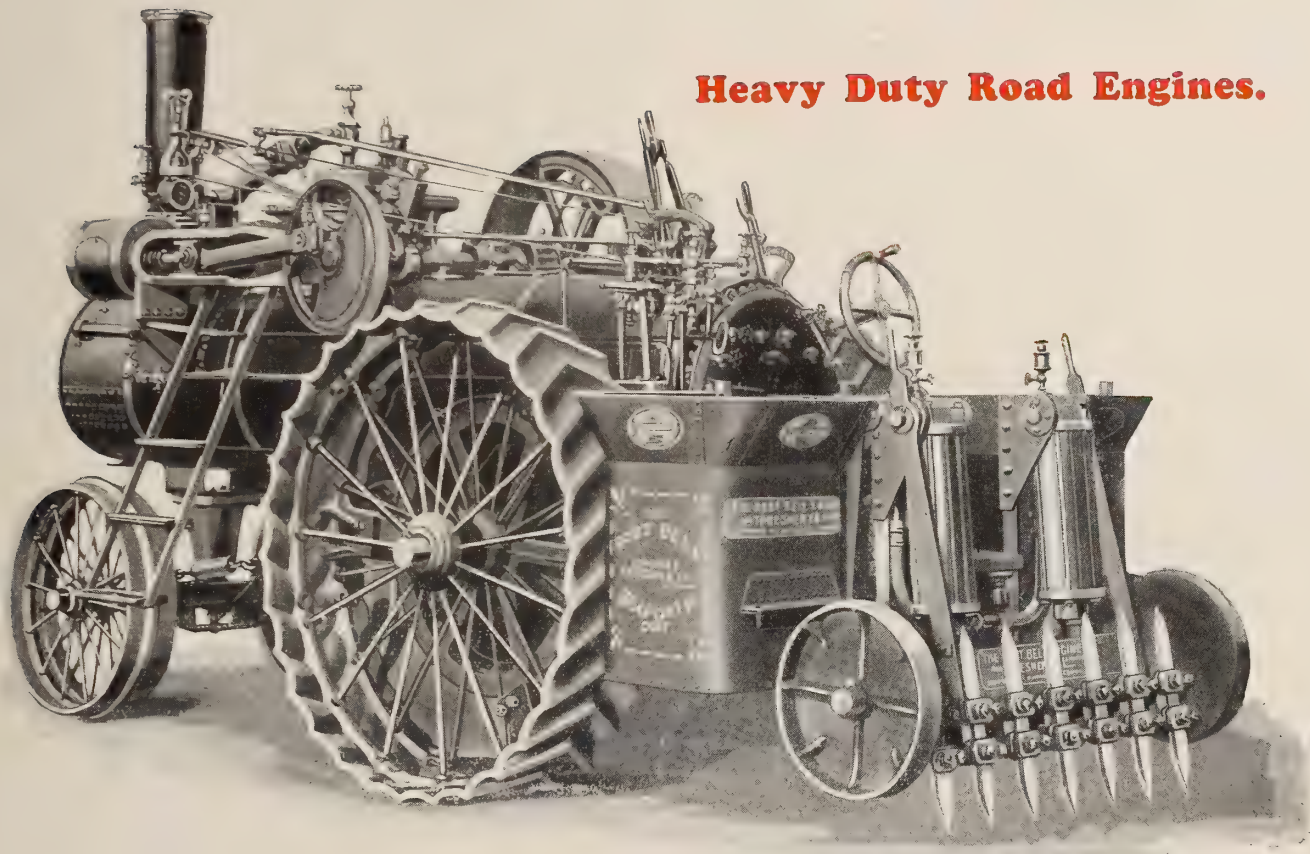
With Scarifiers

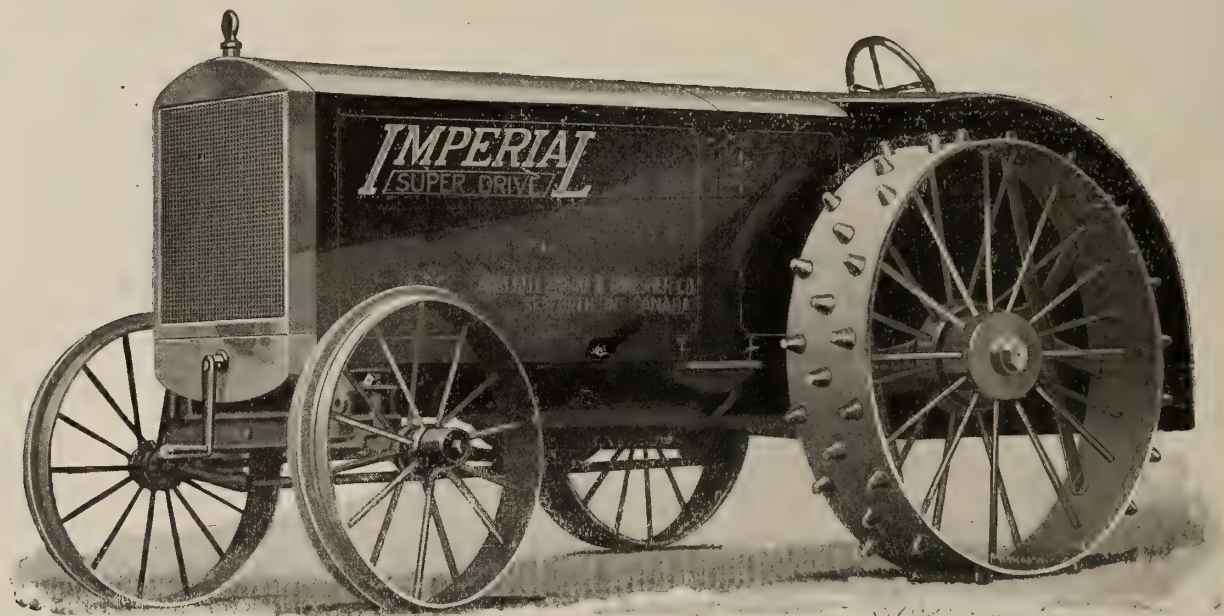
The cut on page 15 shows our Heavy Duty Engine for road building purposes. This Engine is specially adapted for heavy hauling, such as road scarifying, hauling heavy crushers, and other purposes.

The usual practice heretofore, has been to attach Road Scarifiers to the ordinary Road Roller, with the result that the Rollers are very soon pulled to pieces, and put out of commission. Hauling a Scarifier is the most severe work that can be put on an Engine of any kind. Our Engines are built to carry these heavy strains, and will do so without any weakness developing.

We can supply either Sidemount or Rearmount with Scarifier attached, built specially with large water tanks and special coal bunkers.

Heavy Duty Road Engines.





Imperial Tractor—Full View

Imperial Tractor

Sizes 20-35 and 25-45

These Tractors, while rated very conservatively, will actually develop about 10 to 20% more than their rated capacity on the belt, and a corresponding increase on the draw-bar.

While weighing little or no more than the usual type, and about half its power, this high power and comparatively light weight is made possible by the use of specially fine material, and new unusually up-to-the-minute design. We provide more power and less weight than any Tractor made.

Our Motor has been especially designed, and built for the purpose, and, as far as we know, we offer the only Tractor made that is equipped with such. We are submitting herewith a very complete description of this very important part of our Tractor, and ask your careful consideration of the data given. Would call special attention to the dimensions of its working parts, showing their extraordinary strength, and invite comparison with others.

Technical Description of our Kerosene Tractor Engine, Model, KU 20-35.

Type—Four cylinder, vertical "L" head type.

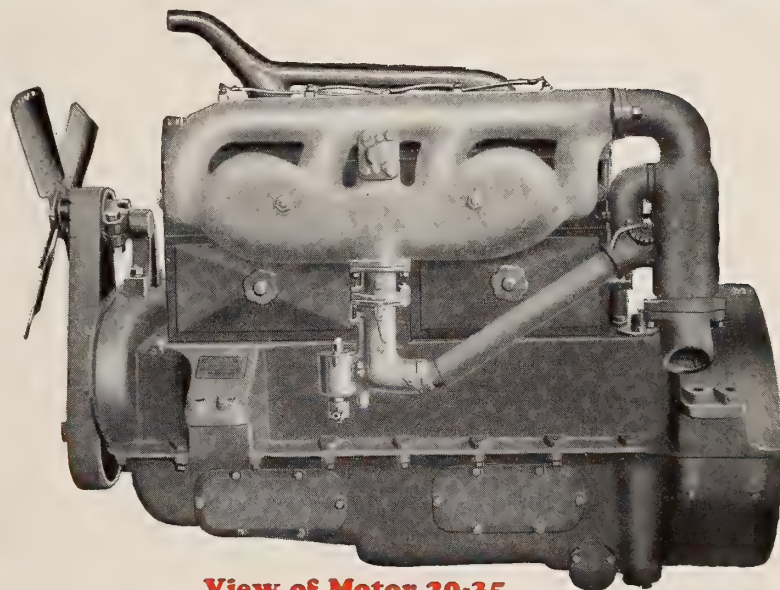
Size—Bore 5 inches, stroke $6\frac{1}{2}$ inches.

Piston Displacement—510.4 cubic inches.

Horse-Power—Conservative rating 35 B.H.P.

Maximum H.P. 40-R.P.M.—800 to 850.

Weight—1,050 pounds.



View of Motor 20-35

Dimensions 25-35

When two dimensions are given, the first is the diameter

Piston pin bearing.....	1-23-64x2 $\frac{7}{16}$
Connecting Rod Bearing.....	2 $\frac{1}{8}$ x3 $\frac{1}{2}$
Crank shaft bearing, front.....	2 $\frac{1}{8}$ x3 $\frac{1}{2}$
Crank shaft bearing, center.....	2 $\frac{1}{8}$ x3 $\frac{1}{2}$
Crank shaft bearing, rear.....	2 $\frac{1}{8}$ x4 $\frac{1}{2}$
Camshaft diameter.....	1 $\frac{5}{16}$
Camshaft bearing, front.....	2x3 $\frac{1}{8}$
Camshaft bearing, center.....	2 $\frac{1}{8}$ x2
Camshaft bearing, rear.....	2 $\frac{1}{8}$ x2
Flywheel diameter.....	17 $\frac{3}{8}$
Flywheel face.....	4
Piston length.....	5 $\frac{3}{4}$
Connecting rod length.....	13
Piston rings, number.....	3
Piston rings, width.....	$\frac{3}{4}$
Water inlet, diameter.....	1 $\frac{1}{2}$
Water Outlet diameter.....	1 $\frac{1}{2}$
Exhaust, pipe size.....	2
Carburetor size.....	1 $\frac{1}{2}$
Flywheel bolts diameter (6).....	$\frac{3}{8}$

When two dimensions are given, the first is the diameter.

Specifications Model TU Tractor Engine

Type—Four cylinder, vertical "L" head.

Size—Bore, 5 $\frac{1}{4}$ inches; stroke, 7 inches.

Piston Displacement—665.2 cubic inches.

Normal—R. P. M.—750-850.

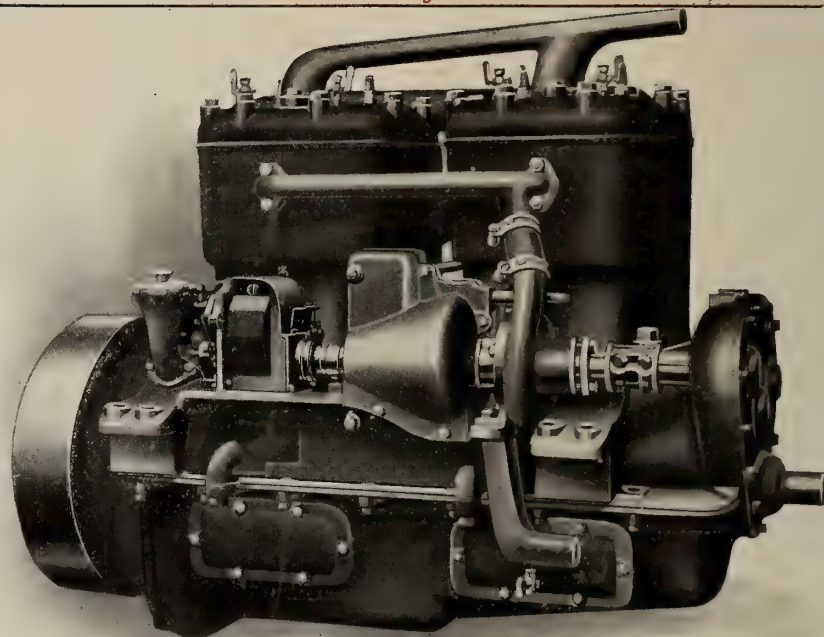
Weight—1550 pounds fully equipped.

When two dimensions are given, the first is diameter.

Dimensions of 25-45

When two dimensions are given, the first is the diameter

Front main bearing.....	2 $\frac{1}{2}$ x3 $\frac{1}{2}$
Center main bearing.....	2 $\frac{1}{2}$ x4 $\frac{1}{2}$
Rear main bearing.....	2 $\frac{3}{4}$ x4 $\frac{1}{2}$
Connecting rod bearing.....	2 $\frac{3}{4}$ x3 $\frac{1}{2}$
Camshaft diameter.....	1 $\frac{5}{8}$
Front camshaft bearing.....	2x3 $\frac{1}{8}$
Center camshaft bearing.....	2 $\frac{1}{8}$ x2
Rear camshaft bearing.....	2 $\frac{1}{8}$ x2
Piston pin bearing.....	2 $\frac{1}{2}$ x2 $\frac{3}{8}$
Piston length.....	7
Piston rings, No.....	3
Piston rings, width.....	$\frac{5}{8}$
Connecting Rod length C to C.....	14



View of TU Motor 25-45

Connecting Rod bolts, No.....	4
Connecting Rod bolts, dia.....	1 $\frac{1}{2}$
Water Outlet diameter (Outside).....	1 $\frac{3}{4}$
Water Inlet diameter (Outside).....	1 $\frac{3}{4}$
Flywheel diameter.....	20
Flywheel bolts, No.....	6
Flywheel bolts, diameter.....	$\frac{5}{8}$
Carburetor.....	1 $\frac{1}{2}$
Fan diameter.....	22

Cylinders

Cast in pairs, of semi-steel. Large water jackets, extending full length of piston, travel and entirely around exhaust passages and valve stem guides. Water passages to cylinder heads are large and well distributed. And there are no steam pockets. Water jackets are accessible for cleaning and provision is made for draining.

Cylinder Heads

These are separate from the cylinders, to which they are bolted by nine $\frac{1}{2}$ " studs in each casting. They are completely water jacketed to a depth of $\frac{3}{4}$ " over the heads. The spark plugs are screwed into the cylinder head casting, not into valve caps. This permits thorough water cooling of the plugs. There are no sharp edges or points in the combustion chamber to heat and cause pre-ignition.

Crank Case

This is a grey iron casting. The greater rigidity and better ability to hold studs and threads makes this material superior to aluminum for tractor work. The crank case is divided on the centerline, the crank shaft bearings being in the upper half. The bearings are well ribbed and the entire crank case is stiff and rigid and well able to withstand severe tractor service.

Crank Shaft

This is of the three bearing type, drop forged of .40 carbon open hearth steel, double heat treated. All bearings are ground to exact size. The crank webs are heavier than is the usual practice, thus strengthening them at their weakest point. The crank shaft is flanged to take the flywheel and is provided with rings to prevent oil leaking from the end bearings.

Connecting Rods

These are drop forged of .40 open hearth steel, heat treated. The connecting rod cap is attached with four $\frac{7}{16}$ " heat treated alloy steel bolts with castellated nuts.

Pistons

These are semi-steel castings, light and well ribbed. Three $\frac{1}{4}$ " rings are used. The upper ring runs over the upper end of cylinder bore which is chamfered to aid in sliding pistons and rings into the cylinder. The piston is chamfered below the bottom ring and holes drilled through to prevent excess oil working up into the combustion chamber.

Bearings

Great care has been taken in selecting the best bearings for each purpose for which they are used. The piston pin bearing is Non-Gran bronze. For the crank pin a babbit lined bronze bearing is used, the babbit being the

highest grade obtainable. The main crank shaft bearings are steel reinforced, die-cast babbit. For the oil pump shaft and the magneto shaft oilless bearings are used, doing away with the necessity for grease cups or hand oiling. The camshaft bearings are a good quality of bronze.

Camshaft

This is a low carbon drop forging, heat treated, carbonized and hardened. The cams and bearings are ground. The cams are 1" face by $1\frac{3}{8}$ " diameter.

Valve Timing

This is worked out to give exceptional power from 600 to 800 R.P.M. as it is at these speeds that the engine will operate under the most severe conditions. At the same time attention is given to the fuel economy which has proved to be remarkably low.

Camshaft Gears

The Camshaft is driven through an idler gear. The crank shaft gear is a drop forging, the other gears semi-steel, all 1" face. The teeth are ten pitch and spiral cut. The crank shaft gear has a fit on the crank shaft of $1\frac{3}{4}$ " diameter by $1\frac{9}{16}$ ". The Idler gear is keyed to a shaft which runs in New Departure ball bearings. This construction is adopted to overcome the excessive wear usually found where an idler gear is used and which quickly results in noisy gears. The ball bearing construction does away entirely with any possibility of wear. The cam-

shaft gear is doweled to a flange on the camshaft by two $\frac{3}{8}$ " dowels on a $1\frac{1}{2}$ " diameter circle. The gear for driving the pump shaft is taper fitted and keyed to the end of the shaft.

Valve Tappets

These are 1" diameter in the guide, of mushroom type, hardened and ground, and adjustable. The guides are cast in pairs and are removable with the tappets by removing one nut.

Valves

These are nickel steel, the lower end being hardened. The valve seat is 45°. The valve spring is held by a pressed steel washer and slotted collar. The clear opening under the valve is $2\frac{1}{4}$ " diameter and the lift $\frac{5}{16}$ ".

Valve Stem Guides

These are removable and can be replaced should they wear.

Flywheel

The flywheel is bolted to the flange on the crankshaft with six $\frac{5}{8}$ " bolts.

Oil Pump

This is of the vane type driven by an enclosed vertical shaft at the rear of the engine. This shaft is driven by bevel gears from the camshaft. It is made in upper and lower sections so that the oil pan may be removed without breaking any connections.

Oiling System

The entire oiling system is of the circulating force-feed type, all bearings being flooded with oil under pressure. The lower half of crank case is an oil reservoir with a capacity of three gallons of oil. From the lowest point, except for a dirt catching sump, the oil is drawn by the oil pump. It is drawn through a bronze screen, with an area of 40 square inches. This screen is easily removed for cleaning. The Oil is circulated entirely through drilled passages, no piping being used. From the pump it is delivered through a vertical drilled passage to the main channel, running the entire length of the engine. From this channel, drilled holes feed the oil, under pressure, to all of the main bearings, crank pins, and camshaft bearings. The excess of oil at the crank pins is thrown off as a spray, which lubricates the cylinder walls, piston pins, cams, etc. The excess of oil flows back to the oil pan, where it is strained, cooled and used again. From the highest point of the Oil circulating system oil flows to the rear case on the front of the engine, thus lubricating the camshaft gears, and their bearings. This system has all of the advantages of the splash system, but is without its disadvantages, particularly when kerosene is used as a fuel. Through poor adjustments, there is always a possibility of some kerosene finding its way into the base where it mixes with the lubricating oil, seriously affecting its lubricating qualities. Where the splash system is used the small amount in the troughs under the connecting rods is quickly diluted and the trouble commences. It necessarily takes a much greater amount of kerosene to

have any material effect upon the large amount of Oil carried in the oil reservoir.

Water Circulation

A centrifugal pump of ample capacity, gear driven, circulates the water through large free passages.

Governor

A governor of the centrifugal ball type controls a throttle valve in the intake passage independent of the carburetor throttle valve, which is itself hand controlled. This governor is entirely enclosed to exclude dust and acts to prevent the engine racing if the load is suddenly thrown off.

Magneto

We recommend and use the Dixie magneto with impulse starter. The magneto together with centrifugal pump and governor are carried upon a bracket which is held by three bolts to the crank case so that it may easily be removed as a unit.

Manifold

The intake and exhaust manifold is our exclusive design and is worked out to give the best possible results when using kerosene as fuel. The kerosene becomes perfectly vaporized before entering the cylinders and the usual troubles attendant upon using kerosene are eliminated. Greater power and lower fuel consumption are obtained by this means.

Dust Exclusion

The protection of the working parts of the engine from the excessive amount of dust and dirt which it will encounter has been carried to an extreme. Every provision is made to keep dust out of the crank case, cylinders, and other parts. The breather on the crank case is of special design. While it relieves any pressure in the crank case, it at the same time, excludes all dust. Ample protection around the bearings is also provided. The valve mechanism is entirely covered by large plates which can be quickly removed without wrenches.

Hand Holes

The oil pan, or lower half of the crank case, is fitted with two large hand holes, on each side which gives easy access to the main and connecting rod bearings for inspection and adjustment. They also greatly facilitate thorough cleaning out of the oil pan when the oil supply is renewed. This is an important feature in tractor service as the oil must be changed at frequent intervals.

Oil Filler

An oil filler on one of the crank case arms is the means provided for filling the oil reservoir.

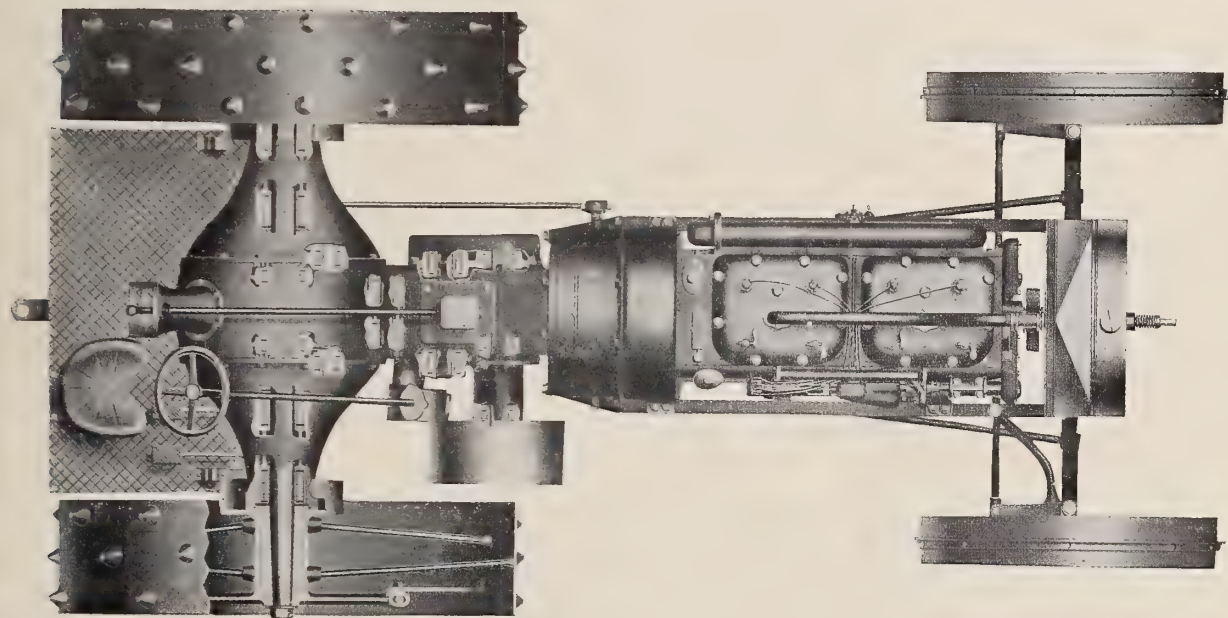
Oil Level Indicator

An indicator is provided to show the amount of oil in the oil reservoir at all times.

The Unit Frame

The main problem in any Tractor is to deliver maximum engine power at the draw bar. We have discarded entirely the Bull Pinion drive, the Open Roller drive, the Chain and Sprocket drive and the Friction drive, all types of which expose more or less of the working parts to dust, dirt and grit and waste varying amounts of power. None of our working parts are exposed.

The ordinary type of Tractor design calls for a channel frame upon which the engine and transmission is mounted. This construction includes innumerable braces, bolts, rivets and other parts liable to twist and strain, not only to the frame itself but to the machinery mounted thereon. It necessitates constant adjustment and repair and at the same time presents a construction so cumbersome and inaccessible as to make this adjusting and repairing difficult. Our Transmission and Final Drive with Live Axle makes a Tractor Frame and Drive combined. Our Unit Frame consists of the Rear Live Axle and Enclosed Transmission coupled direct to the Motor Cradle and Front Axle Support. It is frame and mechanism all in one, self contained, simple, strain and twist proof and powerful.



The Unit Frame

In General

Spade or V shaped removable Grouters supplied with Drive Wheels, Special Angle Bar Extension Grouters can be supplied at an extra moderate charge.

Standard parts throughout assuring ready and economical replacement.

A 5 x 6½ slow-speed, kerosene motor developing 39 horse-power at 800 R.P.M. with four cylinders cast in pairs.

Combined splash and force lubrication assuring perfect oiling of all bearings.

Extra large crank shaft—scientifically balanced and carried on three extra large bearings.

Cylinder heads removable. All main crank shaft and connecting bearings reached by side plates.

Built in Governor, Stromberg Carburetor, Dixie High Tension Magneto, and Air Cleaning device, assuring perfect working of motor.

Radiator High Grade with high speed, 22-inch fan and extra wide fan belt—giving 20 per cent. greater cooling capacity than any other type.

A disk clutch completely enclosed in air-tight bell-housing and having more plates and greater friction surface than any other clutch transmitting the same horsepower.

Live Axle, Spring Cushion, Super-Drive transmitting

more working power to the draw-bar than any other driving principle now in tractor use.

Spring Cushion final drive protecting the entire mechanism from all jar or shock in starting or from jolting caused by rough ground.

All gears made of steel, machine cut, case-hardened, ground and polished, enclosed and running in oil.

Gears and axle mechanism all protected by dust-tight housing, leaving no working parts exposed.

Hyatt heavy duty roller bearings used throughout.

Belt pulley shaft driven directly from transmission gears assuring maximum pulley power.

Standard wheels—Rear, 54 inches—12-inch face with spade lugs. Front, 34 inches, removable flange—clearance 15 inches.

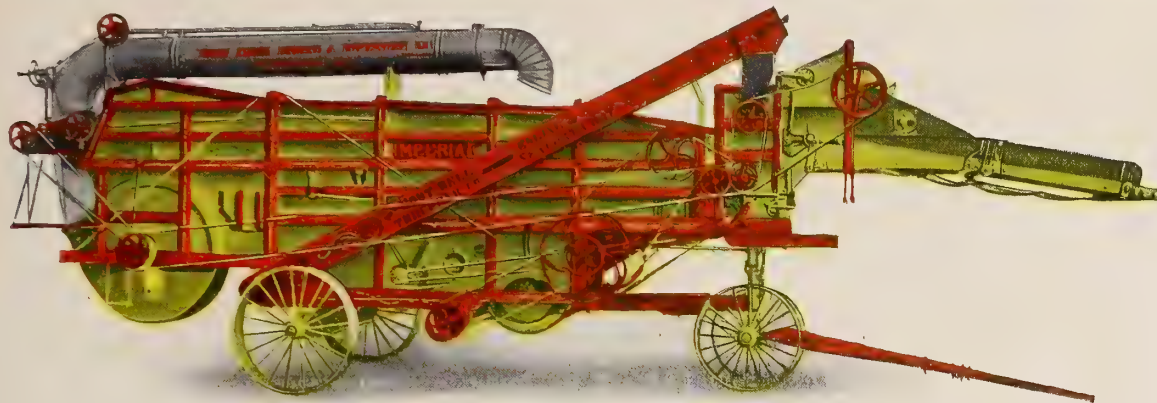
Removable plates give ready access to every transmission and differential part.

Reducing gears may be changed by simple removal of a side plate—in a few moments.

Selective type transmission—two speeds forward—and one reverse.

The only unit frame tractor built with a much needed roomy platform on the rear.

Self Steering—as easy to drive as an automobile.



Imperial Separator

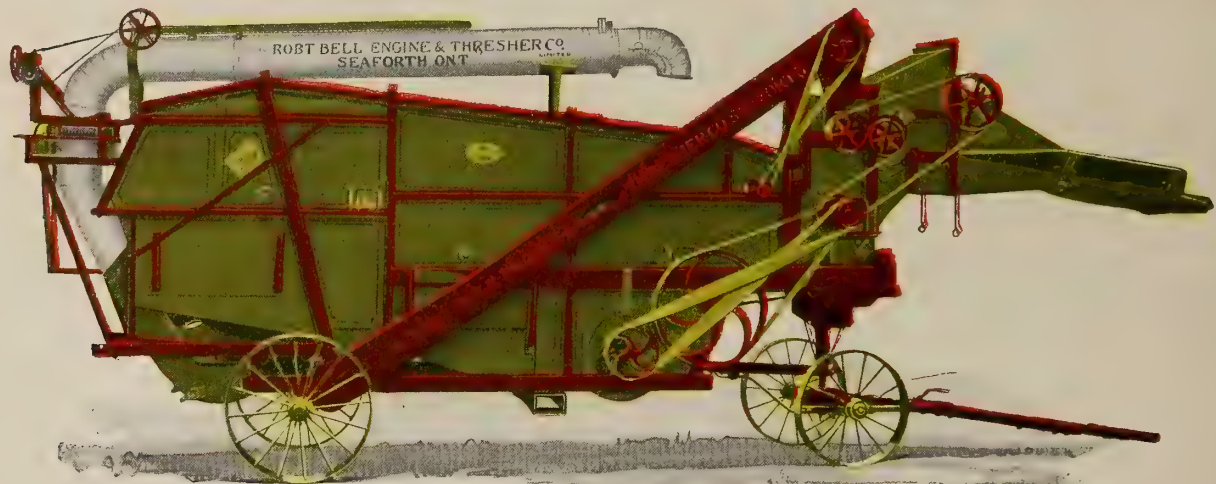
32 x 54 and 36 x 60—With Bell Feeder and Wind Stacker

The Cylinder is of the 12-bar type, specially heavy and strong, the 36-inch size, without pulleys, weighing 560 pounds. The 36-inch and 32-inch cylinder shafts are $2\frac{1}{4}$ -inch special high carbon steel, running in pivotted boxes of special design which adapt themselves to any position of the shaft; impossible to get out of line or heat if kept supplied with oil. The Cylinder and Concave Teeth are both of the same pattern—only one pattern of tooth for the entire machine—are extra large and strong, and made of special material to resist wear. It is not unusual for a single set to last two and three seasons.

We use a spring steel lock washer under every nut, and loose teeth are unknown in the "Imperial."

The larger sizes of machines are double belted as far as the main working parts are concerned, as will be seen by reference to the illustration.

The Trucks are of steel throughout, including Wide Tired Steel Wheels, and STEEL AXLES that are unbreakable. A wooden axle under a threshing machine with feeder and wind stacker is an abomination, expense and loss of time to any thresherman. Do not forget that the "Imperial" is free from this deficiency.

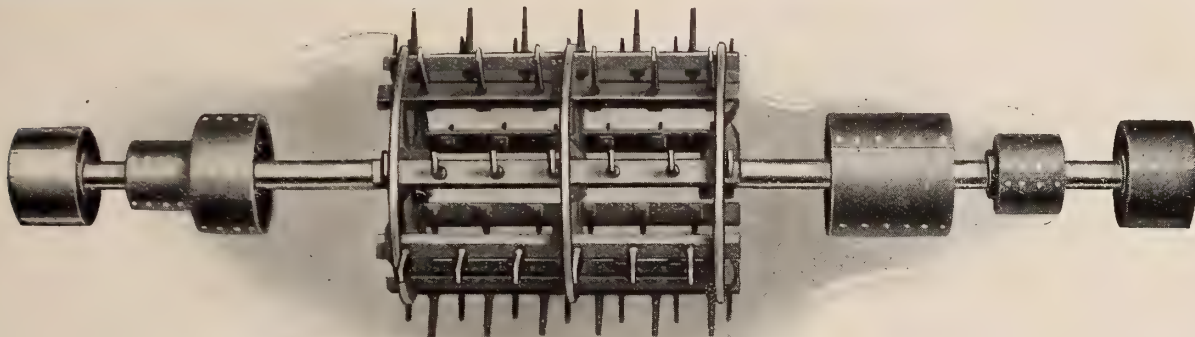


Imperial Junior Separator

When designing this machine we at all times kept in view the fact that almost without exception it would not be operated by experienced threshermen, but by farmers generally for their own use. We succeeded most admirably in our object, which was to provide a threshing machine which could be successfully operated even by the most inexperienced, simple, durable, free from any complicated mechanism or any necessity for expert adjustment of various parts in order to do good work. At the same time its

construction is such that it requires the least power to operate of any machine of its size that we know of, which is of considerable advantage to those possessing small Tractors or other light power.

With reasonable care and attention to its lubrication, it can be operated, day after day, without any lost time for adjustment or repair. Its construction is such, and its working parts so strong, that outside of an unusual accident, it is not liable to breakage in any part. Our customers and



Cylinder

others familiar with it, tell us that it is always on the job, and it is extremely rare that threshing operations have to be suspended through any cause contributed by the machine.

The 28 x 50 and larger sizes have 12 bar cylinders with heavy Lags on each bar. The Cylinder Shaft is $2\frac{1}{4}$ ". The Teeth are square shank and never get loose, and are fitted with lock washers. These cylinders are very heavy, weighing about 560 pounds on the 36" size.

The Cylinder of the 20 x 32 and 24 x 40 is of the 9-bar type, with heavy bars, and heads well keyed to a 1-15 '16" shaft, running in pivoted self-adjusting boxes. These boxes cannot heat or give any trouble if kept oiled, as they adjust themselves to the shaft automatically. The assembly of Cylinder and Concaves is carried in a pair of heavy cast iron plates, securely bolted to the frame work.

The Concaves are extra heavy, and are adjustable both front and back. While 3 rows of teeth are generally ample, provision is made for the use of as high as 6 rows of teeth in case of necessity.

The Teeth are made with round, tapered shanks, which can be drawn tightly into tapered holes, provided, with the least possibility of getting loose. Only one pattern of tooth is needed for both Cylinder and Concaves,



Cylinder Boxes

End View

Side View

doing away with the necessity of keeping different kinds on hand for repairs in case of breakage.

The Grate, behind the concaves and under the beater, is made of wrought iron and steel, has greater capacity than a cast iron grate and is not so liable to breakage.

The Beater, immediately behind the cylinder, has four blades and is entirely made of iron and steel. It serves a triple purpose; (1) keeps the cylinder free from threshed straw (2) prevents grain and straw from shooting back through the machine, and (3) drops it at the extreme inside end of the separating deck, so that the whole length of the deck is made use of in separating the grain from the straw.

The Deck consists of a number of perforated shaker boards combined in a unit, and driven by a separate crank shaft from that which drives the kickers or rakers working between them. These shaker boards are armored at the end nearest the cylinder to prevent their being whipped out

by the flying grain. The Rakers or Kickers working between the shaker boards have a marvellous effect in carrying along the straw and at the same time shaking the grain out of it. This combination of perforated shaker board deck, with kickers or rakers operating between is the most simple, effective and easily driven separating device ever made. The crank shaft operating the deck also drives the grain pan, one counterbalancing the other. The kicker or raker cranks are of the three way type, one counterbalancing the other.

The Shoe has a rolling side shake, is of the simplest construction, and requires no wind boards or other adjustable fittings to clean the grain. Requires no attention whatever and makes almost a perfect sample of grain. A seed screen is provided for the bottom, which may be used or not as desired. Tailings and cleaned grain are discharged from the shoe through shaking spouts forming an integral part of the shoe, which perform their function perfectly, without the usual complicated mechanism required to do this work. The last word in simplicity and efficiency.

The Fan has five wings or blades bolted to cast iron spiders keyed to the shaft, and delivers an overshot blast. Simple adjustable blinds at the sides to give more or less blast as may be required according to condition of grain threshed.

The tailings elevator discharges into the Feeder cylinder, which distributes the tailings evenly into the threshing cylinder. Malleable Link Chain with hardwood scrapers elevate the tailings, with provision for tightening the chain and taking up wear.



Grain Pan

The Grain Pan has bottom of corrugated galvanized steel, with Extension Chaffer of No Choke material. The return pan under the straw deck also has a galvanized steel bottom. Proof against warping or buckling in damp weather.

The Wind Stacker is our special Junior design, of the side fan type. The hopper has plenty of slope to prevent lodging of straw, and all details have been carefully worked out to handle the straw without clogging and the least expenditure of power. Convenient turntable, telescoping pipe device and adjustable hood for directing the flow of straw is provided.

Belt Guide and Reel. An efficient belt guide is fitted on all these machines, as well as a handy reel on which to coil the main drive belt. These conveniences are generally

lacking on small machines or supplied as an extra at a price

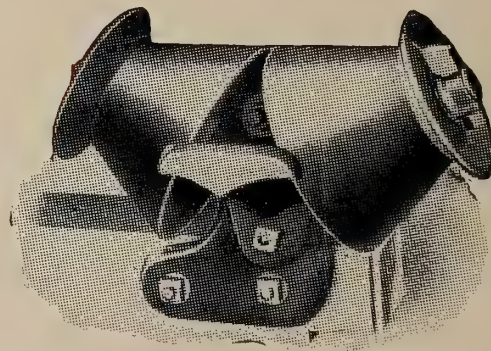
The Trucks. Axles are steel channels with cast iron arms. Will carry the machine anywhere positively without liability of breakage. Wheels are all metal, and with steel 6 inch tires on 24x40 size.

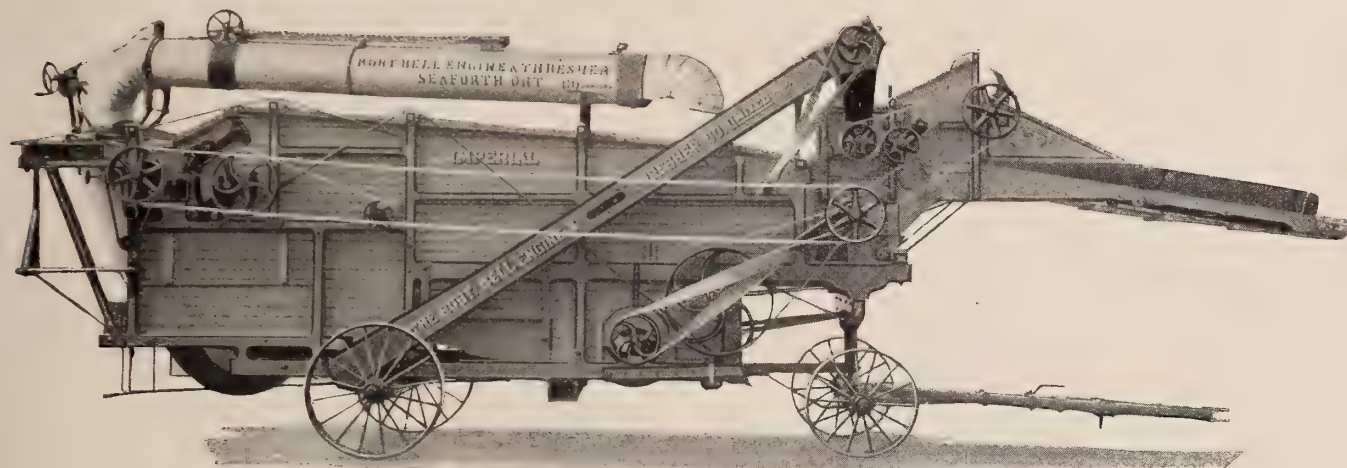
The Tongue is of the same pattern as we have been using on our larger machines, and is the most convenient ever made. The extension telescopes into the base, so that it can be shortened for hauling by tractor; or it can be extended in a moment, for horses.

No other threshing machine made is so thoroughly adapted for use with light tractors or other light power. Its light weight makes it easy to move from place to place

**Pan Crank**

Its extremely light draft will allow its successful operation by Tractors having insufficient power to drive other types of machines of the same size and capacity. Under favorable conditions it has threshed as high as 1,700 bushels of mixed grain in ten hours with no more than 20 actual horse power to operate it. It is so simple, and easily understood that any man of average intelligence can easily operate it without previous experience. And this means a good deal to the average farmer, intending to purchase a machine for his own use with the intention of operating it himself. Attention to its lubrication and keeping the belts sufficiently tight to prevent slippage is all that is required for successful results.

**Imperial Belt Guide**



Imperial Junior Separator

With Straw Cutting Attachment.

Sizes—24×40—28×50—32×50.

Imperial Junior Separator

With Rear Straw Cutting Attachment.

Our Straw Cutting Attachment combines the best ideas and features contained in all other similar machinery, with improvements that are peculiar only to those of our own manufacture.

We are able to produce cut straw that will compare with what is cut in the sheaf with an ordinary cutting box. Previous to the adoption of our improvements, the work done by the ordinary rear cutting attachments was open to criticism, owing to the large percentage of straw passing through uncut. The straw was merely bruised and partly cut. A number of appliances found in the "Imperial" contribute to the superior quality of the cut straw produced by it. Owing to the peculiar motion of the straw decks in our Separator a perfectly uniform depth of straw crossing the entire width of the machine is delivered into the cutting mechanism, and the knives have at all times an even supply of straw from entire length to work upon. The pressure of the feed rolls is the same at every point, and the straw is fed to the knives in a compact uniform mass. The feed mechanism is so arranged that the thickness of the volume of straw is increased while passing through to the knives. The position of the last set of rolls is such that the straw is compressed and held at the cutting edge, ensur-

ing cut straw in every sense of the word, and a spring attachment is now used on the last pair of rolls as an auxilliary, and is a great help with the straw if stiff and coarse, preventing choking in any kind of straw.

When desiring to thresh without cutting the straw the change can be made in a moment. The old way was to remove the ledger plate—a tedious job—and it was necessary to keep the cutting cylinder in motion, an unnecessary waste of power. The "Imperial" way is to throw off the cutter cylinder belt, and by a simple arrangement, requiring only a moment's time, to change the feed rolls and deliver the straw below the ledger plate into the stacker hopper.

Provision is made for the easy sharpening of the cutting cylinder knives in the most convenient and quickest way, by means of an emery roller hung in proper position for the work.

And our Straw Cutting Attachment throughout is constructed in the most durable and workmanlike manner, and is pronounced by all who have had the opportunity of comparing its work with other machines as a revelation in quality of work done and ease of management.

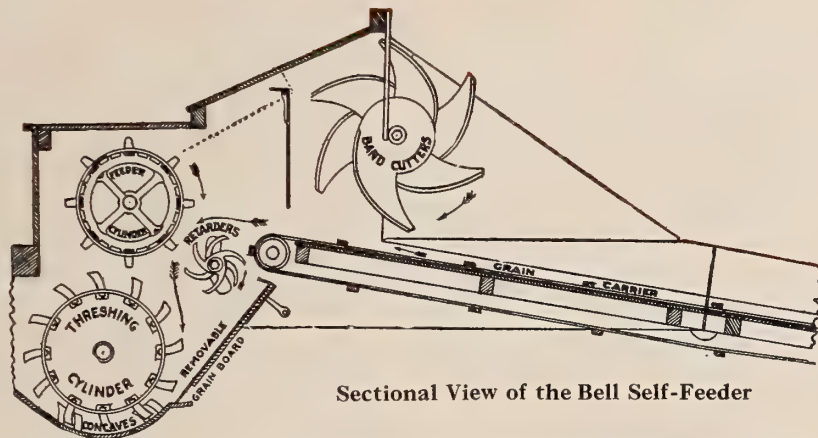
The Bell Feeder

Reference to illustrations of the "Imperial" Separator herein will show the Bell Feeder, both folded for moving and extended for operation. The above cut shows an open side view of the Bell, showing interior working parts, governor, etc.

The Carrier is of heavy canvas, slatted, and will last for years. This canvas carrier is far ahead of any chain rake, as it not only does away with the noise of the chain rake, but there is no liability of chains coming apart and the chain rake being fed into the cylinder, which will occur sooner or later with any feeder containing a chain rake.

After the bands are cut by the rotary knives, which, by the way, can be removed in a few minutes for sharpening, they pass on over the retarders at the end of the carrier, where the under side of the sheaf is securely held. This retarder revolves very slowly, about twenty revolutions per minute, simply fast enough to clear itself. In the meantime, the rapidly revolving feeder cylinder, which is set just above and slightly forward of the threshing cylinder, combs off the top of the sheaf and feeds it ON TOP of the threshing cylinder. This feeder cylinder has a speed of about nine hundred revolutions per minute.

The retarder is equipped with sheet iron guards throughout, making it impossible for it to wind in any kind of condition of grain. The feeder cylinder and thresher cylinder operate so closely together that one keeps the other clear



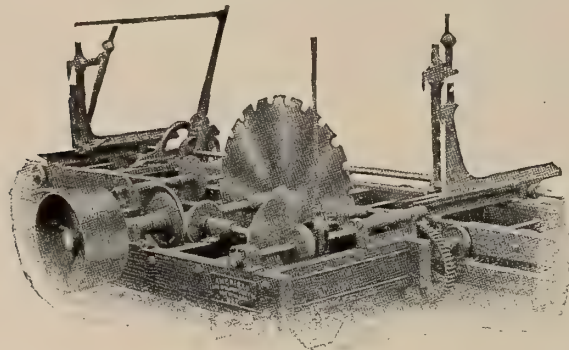
Sectional View of the Bell Self-Feeder

The Governor is the vital point in any feeder. The Bell is fitted with a regular engine governor of the most sensitive type, which is adjustable to any cylinder speed. It is connected to the feeder cylinder and the slightest overloading beyond the point at which it is set will act on the feeder and stop any further delivery of grain to the separator. Note particularly that the threshing cylinder NEVER loses its proper speed through overfeeding, as the governor acts and stops the feeding BEFORE the speed of the threshing

cylinder is reduced, which is a feature not found in any other feeder. All other feeders wait until the separator cylinder loses its speed before shutting down, and then the mischief is done.

We guarantee the Bell Feeder to feed any separator to its capacity, and you can set it to suit any machine, large or small, as to the quantity that the machine can take care of, without any slugging or choking, better than any other self-feeder manufactured, and better than the best hand-feeder can do. Any Bell owner will bear out what we say in this.

We would also call particular attention to the durability of the Bell Feeder. It contains no crank shafts of any kind, all its working parts having rotary motion. Outside of an accident, a Bell operator can confidently look forward to years of use without any expense for repairs.



Improved Variable Friction Feed Saw Mill

VARIABLE FEED. We use Bevel Frictions as the drivers, thus insuring a positive motion, reducing the end and lateral thrust and maintaining a wide range of feed variation. The "gig back" is also positive and will start on the fastest speed without any slipping; it is many times faster than the feed.

TRUCKS. On all our carriages the trucks are of large diameter, fitted with best steel axles running in self-oiling babbitted boxes, with ample provision for taking up all lost motion, and are accurately turned to perfectly fit the guide track.

SET WORKS.—We usually furnish our patented Combination Set Works and Quick Receder, which are accurate and without a single objection, possessing many advantages over any other on the market. What other manufacturers have secured by means of two or three levers, we have obtained with one. Two or three pulls of the lever will recede the blocks as far as is usually required. We can also furnish the larger mills with Double Acting Set Works and Spring or Foot Receder as may be ordered. (Ask for special circular explaining this fully).

Specifications

Cipher Name	No. of Mill	Length of Husk	Width of Husk	Size of Husk Timbers	Diameter of Mandrel	Largest Saw That Can Be Used	Mandrel Pulley	Length of Carriages (Longer Carriages made to order)	Length of Rack	Size of Carriage Timbers	Width of Carriage	Size of Trucks	Diameter of Axles	Number of Trucks	Head Blocks Open	Length of Set Shaft	Length of Track Steel	Weight	Horse Power Required
Ash.....	1	7'	3'	3½' x 7½'	2 ⅜	52	20 x 10	16'	22'	3½' x 5½'	26"	6"	1 ⅛	4	34	14'	40	2100	4 to 15
Beech.....	2	7' 6"	3' 6"	3½' x 9½'	2 ⅞	54	20 x 10	20'	26'	3½' x 5½'	30"	7"	1 ¼	6	38	16'	48	2800	4 to 20
Cherry.....	3	8'	4'	4½' x 11½'	2 ⅞	60	20 x 12	24'	32'	4½' x 6½'	36"	8"	1 ⅞	6	44	20'	56	3700	8 to 25
Dogwood...	4	8' 6"	4'	4½' x 11½'	2 ⅞	60	20 x 12	24'	32'	5½' x 5½'	40"	10"	1 ⅞	6	48	20'	56	4000	15 to 35
Elm.....	5	9'	5'	5½' x 11½'	2 ⅞	66	24 x 14	24'	32'	5½' x 7½'	44"	12"	1 ⅞	6	52	20'	56	6800	20 to 40

No. 1 Mill is equipped with rack feed, or may be equipped with cable feed on special order, All other sizes are equipped with Wire Cable Feed

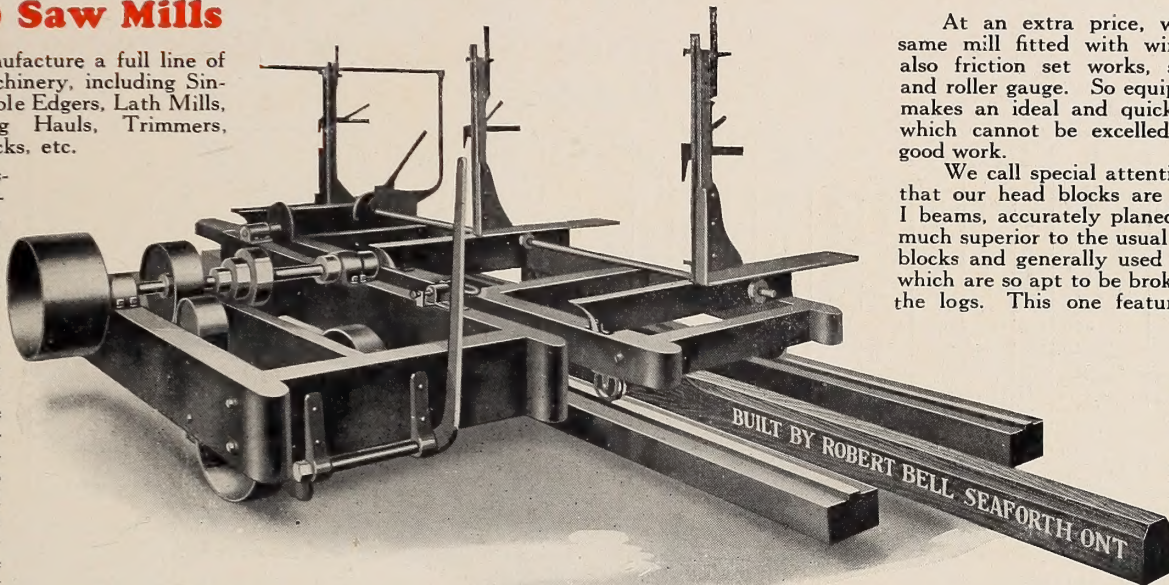
No. 0 Saw Mills

We manufacture a full line of Sawmill Machinery, including Single and Double Edgers, Lath Mills, Bolters, Log Hauls, Trimmers, Lumber Trucks, etc.

The illustration here-with represents our No. 0 Mill, which is more especially adapted for portable work, or the smaller stationary mills. These Mills are generally ordered with two or three head blocks and dogs, although we can supply special carriages with a greater number.

Framework is of selected wood, well framed and bolted. Saw Frame has two long bearings for mandrel, with drive pulley outside of frame, friction feed works 5 inches wide, two changes of feed, splitter, saw guide, etc. Forty feet of track irons goes with each two-block mill, 48 feet with the three-block mill.

Standard Mill is equipped with ratchet set works to set over log, and rack and pinion feed for operating the carriage.



No. 0 Saw Mills—Rack or Cable Feed

At an extra price, we supply the same mill fitted with wire cable feed; also friction set works, spring receder and roller gauge. So equipped, this Mill makes an ideal and quick-acting outfit, which cannot be excelled for fast and good work.

We call special attention to the fact that our head blocks are made of steel I beams, accurately planed and finished, much superior to the usual cast iron head blocks and generally used in small mills, which are so apt to be broken in handling the logs. This one feature makes this

mill worth many dollars more than a mill with cast iron head blocks, as it eliminates almost all chance of breakage, and makes repair bills very infrequent to keep the mill in condition. In fact we very

seldom have any calls for repairs for our mills.

We will be pleased to quote prices for any of these Mills, fitted out in any style. We would also call attention to the line of large Portable Engines we manufacture, an ideal power for these Mills; and in addition, we generally have in stock a number of good rebuilt engines of fair size on wheels and skids, as well as rebuilt stationary boilers and engines from 10 to 75 Horse Power.

Dimensions Bell Traction Engines and Boilers

In Inches

Estimated Traction Rating Horse Power	Cylinder— Diameter and Stroke	Fly Wheel		Fire Box			Shell	Tubes		Heating Surface Square Feet			Grate Area	Thickness—Shell Plate and Heads	Thickness—Flue Sheet in Fire Box	Diameter— Crank Shaft	Length— Bearing Next Disc	Length—Bearing Next Pulley	Diameter— Counter Shaft	Length—Diff. Side Bearing	Length— Left Side Bearing	Diameter— Rear Axles	Face of Gear
		Diameter	Face	Width Inside	Length Inside	Height Inside	Diameter Outside	Number	Length	Diameter	Fire Box	Tubes	Total										
16 Simple.....	8 x10	401	8	23	37 ³ / ₁₆	40	27 ¹ / ₂	36	84	2	42	132	174	5.93	⁵ / ₁₆	¹ / ₂	3	6	8	3	8	6	3 ¹ / ₄
18 Simple.....	8 ¹ / ₂ x10	401	8 ¹ / ₂	24	43 ³ / ₁₆	37	29 ¹ / ₂	40	78	2	45	137	182	7.19	³ / ₈	¹ / ₂	3 ³ / ₁₆	7	9	3 ¹ / ₂	9	9	3 ¹ / ₂
21 Simple.....	9 ¹ / ₄ x10	401	10 ¹ / ₂	24 ¹ / ₂	43 ³ / ₁₆	37	29 ¹ / ₂	40	90	2	45	158	203	7.19	³ / ₈	¹ / ₂	3 ³ / ₁₆	7	9	3 ¹ / ₂	9	9	3 ¹ / ₂
24 Simple.....	10 x10	401	10 ¹ / ₂	25	43 ³ / ₁₆	47	30 ⁵ / ₈	42	96	2	55	177	232	7.50	³ / ₈	¹ / ₂	3 ³ / ₁₆	7	10 ¹ / ₂	3 ³ / ₄	11	10	3 ¹ / ₂
30 Simple.....	10 ¹ / ₂ x11	441	12 ¹ / ₂	30	52	50 ³ / ₄	36	56	96	2	67	240	307	10.75	³ / ₈	¹ / ₂	3 ³ / ₄	10	13	4 ¹¹ / ₁₆	13	13	4 ¹ / ₄
35 Simple.....	11 x11	441	12 ¹ / ₂	30	52	50 ³ / ₄	36	56	109	2	67	280	347	10.75	³ / ₈	¹ / ₂	3 ³ / ₄	10	13	4 ¹¹ / ₁₆	13	13	4 ¹ / ₄
24 Compound.....	7 x10	401	10 ¹ / ₂	26	43 ³ / ₁₆	47	30 ⁵ / ₈	42	96	2	55	170	225	7.50	³ / ₈	¹ / ₂	3 ³ / ₁₆	7	10 ¹ / ₂	3 ³ / ₄	11	10	3 ¹ / ₂
	10 ¹ / ₄ x10														³ / ₈	¹ / ₂	3 ³ / ₁₆						3 ¹ / ₂

We reserve the right to modify or change the goods specified in this Catalogue, or the dimensions of same in such details as will in our judgment improve them.

We call the particular attention of intending purchasers to the above Table of Dimensions of our Engines and Boilers, and invite comparison. Note the especially large fire boxes in the boilers, the heavy plate, and high pressure carried—175 pounds to the square

inch, which increases the power of the engines enormously without much addition to the weight, as compared with engines of the same size cylinders, mounted on boilers carrying a steam pressure of from 100 to 130 pounds only. Note also the ample heating surface in the boilers for their rated horse power.

Send for our List of Rebuilt Engines, Separators and other Machinery.

THE ROBERT BELL ENGINE & THRESHER COMPANY, Limited

Branch Office and Warehouse:
Cor. Vincent and White Street, WINNIPEG, MAN. and REGINA, SASK.

Head Office and Factory:
SEAFORTH, ONT., CANADA

